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The study of risk factors associated with lumbar disc prolapse in north Indian population

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Abstract: *Background:* Symptomatic disc herniation in radiographically normal intervertebral spaces explains the differences in the observed risk patterns. *Objective:* The aim of the study was to investigate the potential associated risk factors and the possible risk factors relevance of physical and psychosocial workload to lumbar disc herniation. *Methods:* A total of 100 cases with acute lumbar disc herniation and 100 as control subjects were studied. Risk factors were examined separately. *Result:* We have found in this study that gender, manual labour, smoking and physically demanding work having a greater risk of developing lumbar herniation. *Conclusion:* Further larger studies are needed to verify the concept of distinct aetiologies of lumbar disc herniation. Younger persons having relatively normal discs and older persons with structurally damaged discs having disc herniation.

Keywords: Body Mass Index, Disc Prolapses, Lumbar Disc Herniation, Lumbar Disc Degeneration.

Introduction

Over time as part of normal aging process, the discs begin to dry out. This leaves the disc's tough outer ring more brittle and vulnerable to cracking and tearing from relatively mild movements, such as picking up a bag of groceries, twisting the lower back while swinging a golf club or simply turning to get in the car. Lumbar disc disease (LDD) is a common musculo-skeletal disease with strong genetic determinants. It consists chiefly of disc degeneration and disc herniation contributing to the development of low back pain, affects 75-80% of all people during their lifetime. LDD is the most common cause of activity limitation in individuals younger than 45 years of age (Andersson 1999) [1]. Lumbar disc degeneration causes low back pain and discogenic pain (Ito et al 1998) and herniation is a common cause of radiculopathy manifesting as unilateral leg pain.

Lumbar disc prolapse is a common spinal disease in adults and develops after 2nd to 3rd decade of life [2]. It may be due to the regular breakdown of tissues within the disc by which biomechanical compositions get changed [3]. Due to this reasons, many complications may occur such as disc herniation, degenerative scoliosis and soreness in the neck, waist and legs. A degenerative disc is having the symptoms of herniation by which severe lower back pain and unilateral leg pain arises [4].

In the lumbar disc prolapse, the effects of reduplicative mechanical forces on the inter-vertebral disc material, experimental to participate a smaller role in the disease than genetic influences [4]. There are several genetic factors found to be connected with lumbar disc prolapse in literature studies include aggrecan [5], interleukins [6-8], vitamin–D receptor [9], the matrix metalloproteinase [10-11], and type I, IX and XI collagen mutations [12-14]. Prolapsed lumbar discs contain an abundant extracellular matrix collection of collagens and proteoglycans. Collagen IX has been measured to provide as a connecting material between collagenous and non-collagenous tissues [15].

Aims and objective:

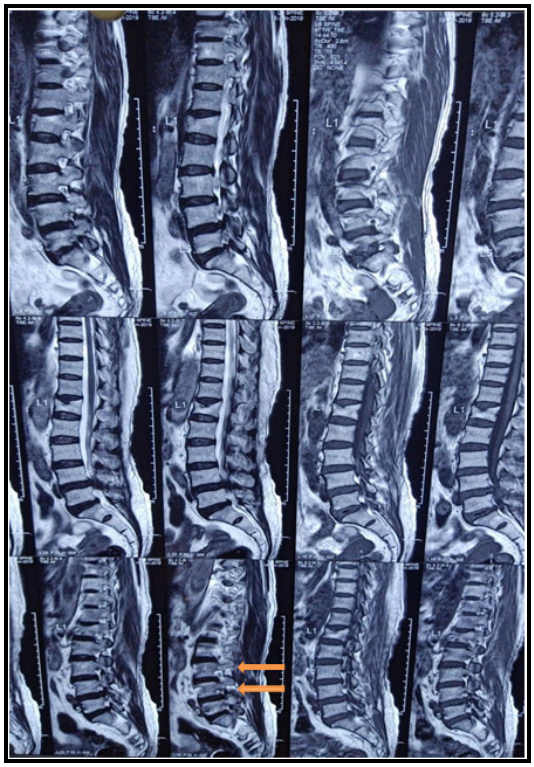
1. Observational case control study investigating risk factors.
2. To study the anatomical changes in lumbar spine in cases of disc prolapse.

The aim of this study was to investigate risk factors that predispose individuals to lumbar intervertebral disc herniation severe enough to warrant surgery of the lower spine (L4/L5 or L5/S1) among the isolated populations.

Material and Methods

Study Subjects: We identified all subjects of the lower spine due to lumbar intervertebral disc herniation L4/L5 or L5/S1.

Fig-1: Early disc desiccations and mild right foramina disc bulge involving L5-S1 disc. There mild posterior disc bulge involving L4-5 disc exiting nerve root appear normal.



The study examined in 100 lumbar disc prolapse patients was involved in this case control study. In the case group of 100 patients, 66 were men and 34 were women. The mean ages (range) of the patient and control groups were 43 (18-70) 42.5 (20- 65) years respectively. All patients had received radiographic evaluation including plain radiographs and MRI and had been monitored for at least 1 year. The grade of disc degeneration was determined according to *Schneiderman's classification* of MRI (schneiderman et al. 1987 [16]).

Patients who were involved in the case group meet the following criteria**:** The imaging diagnosis method, clinical signs and symptoms were applied to diagnosing lumbar disc herniation. Imaging diagnosis method*: Pfirmann grading* is a very reliable imaging method for the diagnosis of lumbar disc herniation. It is a grading of the relationship between the disc herniation and the nerve heel. The study protocol was approved by ethical committees of the institution and written informed consent was obtained from all participants prior to joining the study.

Moreover no patients received any medical treatments within a week before obtaining the blood samples served for the study. All patients were agreed to do standardized neurological examinations. Patients had reported unilateral pain radiating from the back along the femoral or sciatic nerve to the corresponding dermatome of the nerve root for longer than 3 months. The grade of disc degeneration was determined according to Schneiderman's classification for MRI [16].

Table-1: Schneiderman's classification

Grade	Description
Normal	No signal changes
1	Slight decrease in nucleus Pulposus signal intensity
2	Hypointense nucleus pulposus with normal disc height
3	Hypointense nucleus pulposus with narrowing disc space

Exclusion criteria:

1. Age group below 18 and more than 60.
2. Occupations involving rigorous activity.
3. Patient with a history of spinal trauma, spinal deformity, metabolic bone disease, spinal infection or tumour.
4. BMI more than 30.
5. Patients doing jobs that required unsupervised heavy physical lifting (warehouse worker, furniture movers, construction workers etc.)

Inclusion criteria:

1. Age group 18-60 years with both genders.
2. Known cases of disc prolapse associated with risk factors.
3. Evidence of disc prolapse as per MRI.
4. Pain score of >3, scores of VAS.

Statistical Analysis: All analyses and test were conducted by Stata version 12.0 (Stata Corp, College Station, TX). The *p* value <0.05 was considered to indicate statistical significance. *P* value obtained using chi-squared test and from independent sample *t* test.

Results

100 Cases were considered for this study. Magnetic Resonance Imaging (MRI) was conducted to look for the changes in the lumbar disc. In this we have found that gender, manual labour, smoking and physically demanding work having a greater risk of developing lumbar herniation. The number of men and women was equal in two groups which were 50 each. The mean age and sex were matched in this study. So, there were no significant difference in the basic characteristics between cases and controls.

Table -2: Different variables of male and female

Variable(s)	Cases (n=100)	Controls (n=100)	*P* value
Sex N (%)			0.063
Male	66	66	
Female	34	34	
Age, Year Mean ± S.D	43±12.6	42.5±13.8	0.080

Studies selection - Association analysis, Factors that may add to the risk of developing a lumbar herniated disc include:

1. *Age:* The most common risk factor is being between the ages of 35 and 50. The conditions rarely cause symptoms after the age of 80. [17]
2. *Gender:* Men have roughly twice the risk for lumbar herniated discs compared with women [18].
3. *Physically demanding work:* Jobs that require heavy lifting and other physical labour have been linked to a greater risk of developing a lumbar herniated disc. Pulling, Pushing, and twisting actions can add to risk if they are done repeatedly [19].
4. *Smoking:* Nicotine limits blood flow to spinal discs, which speeds up disc degeneration and hampers healing. A degenerated disc is less pliable, making it more likely to tear or crack, which can lead to a herniation. The medical literature is mixed on whether people who smoke are at greater risk for a new herniation following a discectomy [20- 22].

Discussion

Various risk factors were widely considered to be related to symptomatic LDD, including environmental, ergonomic, and biometric factors. Many previous studies of Indian shaving a strong association with lumbar disc prolapse [23-24].

Previous studies have explored many potential risk factors such as age, gender, BMI, smoking, disc protrusion, diabetes and occupational work and so on. Concerning smoking, we speculated that for smokers it was more likely to suffer and had significant association. With regard to gender, when subgroup analysis was based on different study locations, we found that for male patients was more likely to suffer.

Conclusion

With an aging population, inter vertebral disc disease is becoming more prevalent in society and contributes significantly to the years of life disability. Occurrence of lumbar disc herniation severe enough to require surgery of the lower spine can be predicted using a very simple set of criteria. This type of screening could reduce the need for surgery in isolated communities through prevention within primary health care.

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References

1. Andersson GB. Epidemiological features of chronic low-back pain. *Lancet,* 1999; 354:581-585.
2. Anjankar SD, Poornima S, Raju S et al. Degenerated intervertebral disc prolapse and its association of collagen 1 alpha 1 Spl gene polymorphism: A preliminary case control study of Indian population. *Indian J. Orthop,* 2015; 49:589-594.
3. Borenstein DG. Epidemiology, Etiology, diagnostic evaluation and treatment of low back pain. *Curr. Opin. Rheumatol,* 2001; 13:128-134.
4. Frymoyer JW. Lumbar disc disease: Epidemiology. *Instr. Course Lect,* 1992; 41:217-223.
5. Battie MC, Videman T, levalahti E et al. Heritability of low back pain and the role of disc degeneration. *Pain*, 2007; 131:272-280.
6. Mayer JE, Iatridis JC, Qureshi SA et al. Genetic polymorphism associated with intervertebral disc degeneration. *The spine J,* 2013; 31(3):299-317.
7. Takae R, Matsunaga S, Origuchi N, Yamamoto T, Morimoto N, Suzuki S et al. Immunolocalization of bone morphogenetic protein and its receptors in degeneration of intervertebral disc. *Spine*, 1999; 24: 1397-1401.
8. Le Maitre CL, Freemont AJ, Hoyland JA. The role of interleukin-1 in the pathogenesis of human intervertebral disc degeneration. *Arthritis Res Ther.* 2005; 7: R732-R745.
9. Raj PP. Intervertebral disc: Anatomy physiology pathophysiology treatment. *Pain tract,* 2008;8(1):18-44.
10. Goupille P, Jayson MI, Valat JP, Freemont AJ. Matrix metalloproteinases: the clue to intervertebral disc degeneration?. *Spine,* 1998; 23:1612-1626.
11. Urban JA, Maroudas MT, Bayliss and Dilon J. Swelling pressure of proteoglycans at the concentrations found in cartilaginous tissue. *Biorheology,* 1979; 16:447-464.
12. Stoeckelhuber M, Brueckner S, Welsch U et al. Proteoglycans and collagen in the intervertebral disc of the rhesus monkey (macaca mulatta). *Annals of Anatomy,* 2005; 187: 35-42.
13. Michael T and Johnstone B et al. The lumbar spine and back pain, Churchill Livingstone, fourth edition; chap. 7, *Biochemistry of the intervertebral disc,*1992;111-127.
14. Heather AH, Robert S, Menage J, Evans H et al. Cells from different regions of the intervertebral disc, effect of culture system on matrix expression and cell phenotype. *Spine,* 2002; 10:1018-1028.
15. Howard AS, Anderson PA, Haughton VM, Lotz JC et al. Disc degeneration: *Summary Spine,* 2004; 29(23):2677-2678.
16. Schneiderman G, Flannigan B, Kingston S, Thomas J, Dillin WH, Watkins RG. Magnetic resonance imaging in the diagnosis of disc degeneration: correlation with discography. *Spine*, 1987; 12:276-281.
17. Ma D, Liang Y, Wang D et al. Trend of the incidence of lumbar disc herniation: decreasing with aging in the elderly. *Clinical interventions in Aging.* 2013; 8:1047-1050.
18. Slipped Disk: Overview, National Library of Medicine, *PubMed Health.* Oct.9, 2014. Available from; *www.ncbi.nlm.nih.gov/PubMed.health /PMH0072656.*
19. Schroeder GD, Guyre C, Vaccaro A. The epidemiology and pathophysiology of lumbar disc herniations. *Seminars in Spine Surgery.* 2016; 28(1):2-7.
20. Huang W, Qian Y, Zheng K, Yu L, Yu X. Is smoking a risk factor for lumbar disc herniation?. *European Spine Journal,* 2016;25(1):168-176. First online: 10 July 2015. Link. *springer.com/article/ 10.1007/2Fs00586-015-4103-y*.
21. Shin BJ. Risk Factors for Recurrent Lumbar Disc Herniations. *Asian Spine Journal.* 2014; 8(2):211-215.
22. Leven D, DO, PT; Peter G, Passias P, MD, Thomas J. Errico T, et al. Risk Factors for Reoperation in Patients treated surgically for intervertebral disc herniation: A subanalysis of eight year sport data. *J Bone joint surg Am,* 2015; 97(16):13161325.
23. Noponen-Hietala N, Virtanen I, Karttunen R, Schwenke S et al. Genetic variations in IL6 associate with intervertebral disc disease characterized by sciatica. *Pain*, 2005; 114:186-194.
24. Rathod TN, Chandanwale AS, Gujrathi S, Patil V et al, Association between single nucleotide polymoprphism in collagen IX and intervertebral disc disease in the Indian population. *Indian J. Orthop.* 2012; 46: 420-426.

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